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Halogen incandescent lamp

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Halogen incandescent lamp

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The invention relates to a halogen incandescent lamp comprising a transparent sealed bulb, a gas filling comprising an inert gas and a halogen additive, a luminous element which is attached to a current supply system extending in a pinched portion of the bulb, and a mount extending from at least near the outside of the pinched portion into the bulb and comprising at least one metal support wire which retains the luminous element in the vicinity of the end of the bulb remote from the pinched portion.

A lamp of this type is described in international patent application publication number WO 02/075778. The length of the luminous element determines the power characteristics of the lamp, and in general it is therefore desirable to have the option to choose the length and (in relation therewith) the shape of the luminous element in dependence of the power of the lamp. The mount supporting the luminous filament of the known lamp consists of a bent metal support wire which is connected with electrical conduction to a central sealing foil, which in turn is connected with electrical conduction to a centre pin. The three interconnected parts (support wire, foil and centre pin) are embedded in the pinched portion of the bulb, extending at both sides thereof. Thereby the central portion of the luminous filament inside the bulb has a live electrical connection to the environment, which is unwanted in some applications, and can even be dangerous.

The object of the invention is to provide a reliable and efficient halogen incandescent lamp of the above mentioned type, wherein the luminous filament in the bulb is supported in a stable manner by the metal support wire and/or wherein the luminous element can be arranged in many different shapes and lengths, wherein there is no live connection from the luminous element to the environment, apart from the power supply system of the lamp.

In order to achieve the mentioned objectives the mount comprises a non-conducting part such that the outer end of the part of the mount at or near the outside of the pinched portion, and the support wire are electrically insulated from each other.

In a first preferred embodiment the non-conducting part comprises a pedestal which is supported by the bulb or the pinched portion thereof, preferably at least partially extending in the pinched portion, and that the at least one metal support wire extends from

the pedestal. In this manner it is possible to choose any number of support wires necessary to form a luminous element of a required shape (for instance a V, U or W shape, or even more complex three dimensional shapes) or length. Hereby a compact lamp can be obtained having a sufficiently long luminous element.

5 Preferably the pedestal comprises a rod or a capillary substantially extending in the pinched portion and a bead substantially extending inside the bulb. Thereby it is possible to insert the capillary part of the pedestal instead of the prior art centre pin and feedthrough, while there is enough space in the extending bead for inserting a sufficient number of support wires in the required configuration, and changes to the currently used
10 production methods are minimised. Preferably the pedestal is substantially made of glass, preferably of the same kind as the bulb, for instance a hard glass or a quartz glass. If the bulb is made of quartz glass more preferably the glass is a however a quartz transition glass, which has good wetting and softening characteristics when the pedestal is heated for inserting the support wires and for embedding the pedestal in the pinched portion. In particular it is
15 important that the thermo-mechanical properties of the pedestal, such as the coefficient of expansion match with the pinched portion. Preferably the softening temperature of the pedestal is substantially lower than that of the pinched portion.

 In a second preferred embodiment the non-conducting part comprises a bead, preferably made of glass, more preferably made of a copper-based glass, such as for instance
20 CorningTM batch 901ADY, which is applied to the outside of the pinched portion.

 The invention also relates to a method for producing a lamp wherein the part of the mount which extends outside the pinched portion is substantially removed before the bead is applied to the outside of the pinched portion. Preferably the bead is heated by IR radiation in order to apply the bead.
25

 The invention will now be explained in more detail below with reference to the embodiments in the figures. In the drawings:

 Fig. 1a is a front elevation of a prior art halogen incandescent lamp;
30 Fig. 1b is a side elevation of the halogen incandescent lamp of Fig. 1a;
 Fig. 2a is a front elevation of an alternative embodiment of a halogen incandescent lamp;
 Fig. 2b is a side elevation of the halogen incandescent lamp of Fig. 2a;

Fig. 3 is a front elevation of a further alternative embodiment of a halogen incandescent lamp;

Fig. 4a is a front elevation of still a further alternative embodiment of a halogen incandescent lamp; and

5 Fig. 4b is a side elevation of the halogen incandescent lamp of Fig. 4a.

Figures 1a and 1b are the front elevation and the side elevation of a halogen incandescent lamp 1 for general lighting purposes which is suitable for direct connection to
10 line voltage, such as a 220 V mains. The halogen incandescent lamp 1 has a cylindrical bulb 2 made from quartz glass with an outside diameter of 12.75 mm and an overall length of approximately 45 mm. The inner space of the bulb 2 is filled in a known way with an inert gas mixture which is known per se, often containing a conventional halogen additive.

The end of the bulb 2 remote from pinch 3 bears a dome which has what is
15 called an exhaust tip in the centre. The other end of the bulb 2 is hermetically sealed with pinch 3. The substantially parallel outer surfaces of the single pinch 3, which are produced by the direct action of a pinching tool, are arranged in the centre and symmetrically relative to the lamp axis. A plane in which the two ends of the luminous element 4 are located is present centrally in the interior of the pinch 3 so as to be parallel thereto.

20 The two limbs of the luminous element 4 are bent into the shape of a U, located in the extension of the above-named plane, and are arranged symmetrically relative to the lamp axis.

The luminous element 4, consisting of a material customary for halogen lamps as for instance wolfram, has a luminous and continuously coiled section. Its two ends each
25 have a non-coiled supply lead portion 6, which adjoin directly thereto. The supply leads 6 are partly sealed into the pinch 3, and are connected with electrical conduction to sealing foils 7 embedded in the pinch 3, and serve for power supply thereby. These two supply leads 6 are arranged parallel to one another in the pinch 3, the sealing foil 7 and a contact pin 8 following each supply lead in alignment, one behind the other. The two contact pins 8 are
30 connected with electrical conduction to the respective sealing foils 7. They are partly embedded in the pinch 3 and partly project from the pinch 3. The two supply leads 6, the two outer sealing foils 7 and the pin contacts 8 form the power supply system of the lamp.

According to Figures 1a and 1b the luminous element is held twice by the support wire 5 in that portion which is arranged transverse to the lamp axis. The coiled and

bent support wire 5, which is made of a material customary for halogen lamps, such as molybdenum, is partly sealed and fixed in the pinch 3, substantially axially parallel between the two parts of the power supply system, and is connected with electrical conduction to a central sealing foil 13 embedded in the pinch 3. The centre pin 11 is connected with electrical conduction to the central sealing foil 13, and is partly embedded in the pinch 3 and partly projects from the pinch 3. As may be seen in Figure 1b the bending line of the support wire 5 lies in a plane which is at right angles to the plane in which the limbs of the luminous element 4 are arranged. At its other end, in the region of the two support points, the support wire 5 is designed as a projecting hook whose opening faces the end of the bulb 2 remote from the pinch.

The metal inner part of the halogen incandescent lamp 1, including the luminous element 4, the centre pin 11, the support wire 5, the supply leads 6, the sealing foils 7, 13, and the pin contacts 8, comprises a mechanically stable semi-finished product which was manufactured in one or more mounting steps before the final assembly of the halogen incandescent lamp 1, i.e. in particular the joining together of the glass part and the metal inner parts.

According to Figures 2a and 2b the luminous element 4 is held by two bent metal support wires 5. Support wires 5, preferably made of molybdenum are designed and bent such that they do not interfere with the upright portions of luminous element 4. The support wires 5 are partly sealed and fixed in a glass pedestal comprising a capillary 9 and a bead 10. Capillary extends substantially in the pinch 3, whereas bead 10 extends substantially in the inner space of bulb 2. The material of the pedestal can be quartz glass, but preferably is quartz transition glass, having better wetting and softening characteristics when inserting the support wires 5, and matching with the material of the bulb 2 when the pedestal is embedded therein. The support wires are inserted in the bead 10 and a centre pin 11 is inserted in the capillary 9 when the pedestal is still hot and soft, whereafter the pedestal is cooled down, fixing the metal elements therein. Although centre pin 11 is similar to pin contacts 8, it is electrically isolated from the luminous element 4 and does not act as an electricity conductor. At its other end, in the region of the two support points, the support wires 5 are designed as projecting hooks whose openings face the end of the bulb 2 remote from the pinch.

The substantially metal inner part of the halogen incandescent lamp 1, including the luminous element 4, the glass pedestal 9, 10, the centre pin 11, the support wires 5, the supply leads 6, the sealing foils 7, and the pin contacts 8, comprises a mechanically stable semi-finished product which was manufactured in one or more mounting

steps before the final assembly of the halogen incandescent lamp 1, i.e. in particular the joining together of the glass pinch/bulb portion and said substantially metal inner part.

Figure 3 shows front elevation of an alternative embodiment of a halogen incandescent lamp, similar to the embodiment in Figures 2a and 2b, wherein an extra support wire 5a, which is shorter than support wires 5, is holding luminous element 4. Support wire 5a is also partly sealed and fixed in bead 10 at its one end. At its other end support wire 5a is designed as projecting hook whose opening faces the pinch end of the bulb 2. Thereby the central portion of luminous element 4 is held in a V-shaped form, the whole of luminous element 4 having a W-shaped form thereby. The man skilled in the art will appreciate that many variations with regard to the form of luminous element and the number and shape of support wires 5, 5a are possible, including a V-shaped luminous element 4 supported by one single support wire 5, as well as complex three dimensional shapes. This flexibility in shapes provides a wide range of possible lengths for the luminous element 4, and thereby a wide variety of possible lamp powers.

Figures 4a and 4b show the lamp according to Figures 1a and 1b, however in order to insulate the centre pin 11, which is electrically connected to the luminous element 4, the extending part of the centre pin 11, i.e. the part which extends outside the pinch 3, is removed, and a bead 12 is applied on the pinch 3 in order to cover the opening where through the remaining part of the centre pin 11 is visible. Although bead 12 could be made of a ceramics material, the bead 12 is preferably made of a kind of glass which matches the properties in terms of coefficient of expansion of the quartz glass of which the pinch 3 is made, yet has a lower softening temperature. In particular the bead is made of a copper-based glass, such as CorningTM batch 901ADY. This copper-based glass has a black colour and can be heated by a flame or by focussed IR radiation. It can be applied at a temperature of approximately 900 - 1000 °C.

CLAIMS:

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1. A halogen incandescent lamp comprising a transparent sealed bulb, a gas filling comprising an inert gas and a halogen additive, a luminous element which is attached to a current supply system extending in a pinched portion of the bulb, and a mount extending from at least near the outside of the pinched portion into the bulb and comprising at least one
5 metal support wire which retains the luminous element in the vicinity of the end of the bulb remote from the pinched portion, characterized in that the mount comprises a non-conducting part such that the outer end of the part of the mount at or near the outside of the pinched portion, and the support wire are electrically insulated from each other.
- 10 2. A lamp according to claim 1, characterized in that the non-conducting part comprises a pedestal which is supported by the bulb or the pinched portion thereof, and that the at least one metal support wire extends from the pedestal.
3. A lamp according to claim 2, characterized in that the pedestal at least partially
15 extends in the pinched portion.
4. A lamp according to claim 3, characterized in that the pedestal comprises a capillary substantially extending in the pinched portion and a bead substantially extending inside the bulb.
- 20 5. A lamp according to any of the previous claims 2 - 4, characterized in that the pedestal is substantially made of glass.
6. A lamp according to any of the previous claims 2 - 5, characterized in that the
25 bulb is made of a quartz glass and the pedestal is made of a quartz transition glass.
7. A lamp according to any of the previous claims 2 - 6, characterized in that the mount comprises two, three or more metal support wires extending from the pedestal.

8. A lamp according to claim 1, characterized in that the non-conducting part comprises a bead, preferably made of glass, more preferably made of a copper-based glass, which is applied to the outside of the pinched portion.

5 9. A method for producing a lamp according to claim 8, characterized in that the part of the mount which extends outside the pinched portion is substantially removed before the bead is applied.

10 10. A method for producing a lamp according to claim 8 or 9, characterized in that the bead is heated by IR radiation in order to apply the bead.

ABSTRACT:

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A halogen incandescent lamp comprising a transparent sealed bulb (2), a gas filling comprising an inert gas and a halogen additive, a luminous element (4) which is attached to a current supply system (7, 8, 9) extending in a pinched portion (3) of the bulb, and a mount (5, 9, 10, 11, 12, 13) extending from at least near the outside of the pinched portion (3) into the bulb (2) and comprising at least one metal support wire (5) which retains the luminous element (4) in the vicinity of the end of the bulb (2) remote from the pinched portion (3), wherein the mount (5, 9, 10, 11, 12, 13) comprises a non-conducting part (9, 10; 12) such that the outer end of the part (11; 12) of the mount (5, 9, 10, 11, 12, 13) at or near the outside of the pinched portion (3) and the support wire (5) are electrically insulated from each other.

Fig. 4a

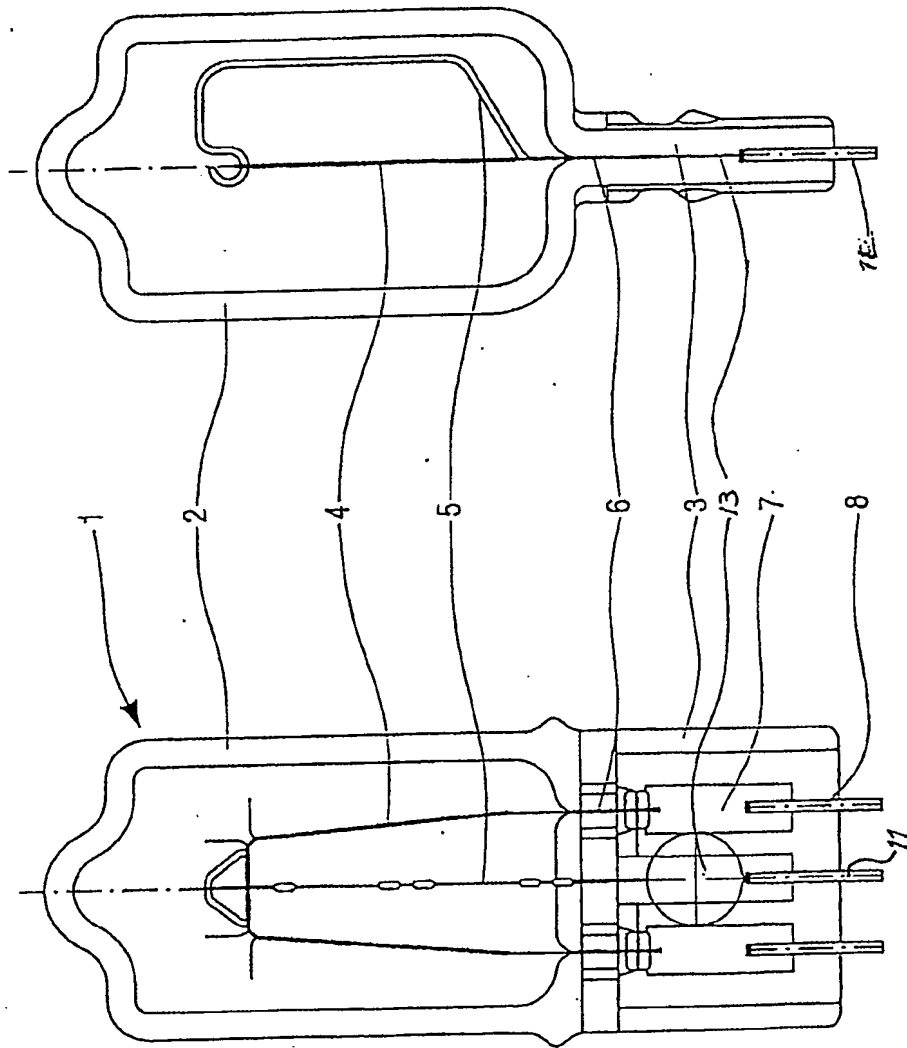


FIG 1B

FIG 1A

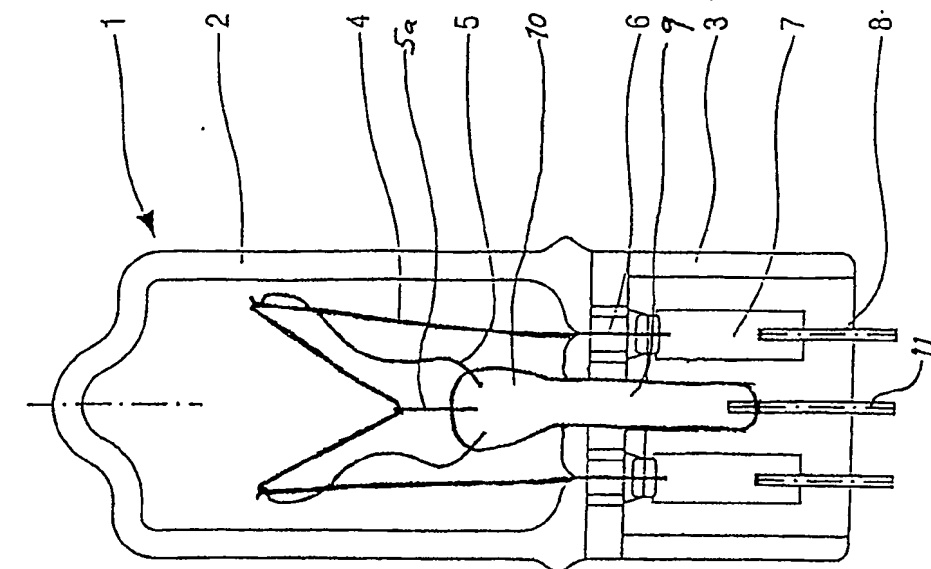


FIG. 3

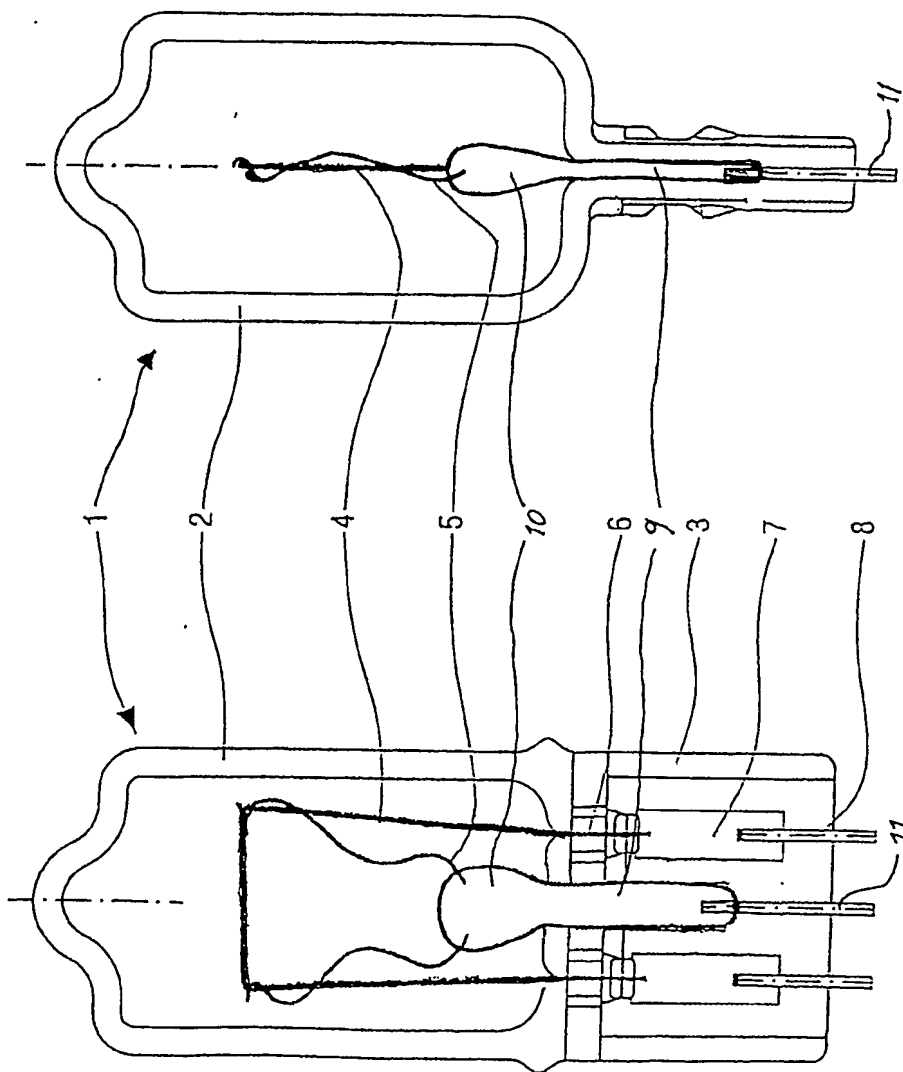


FIG. 2B

FIG. 2A

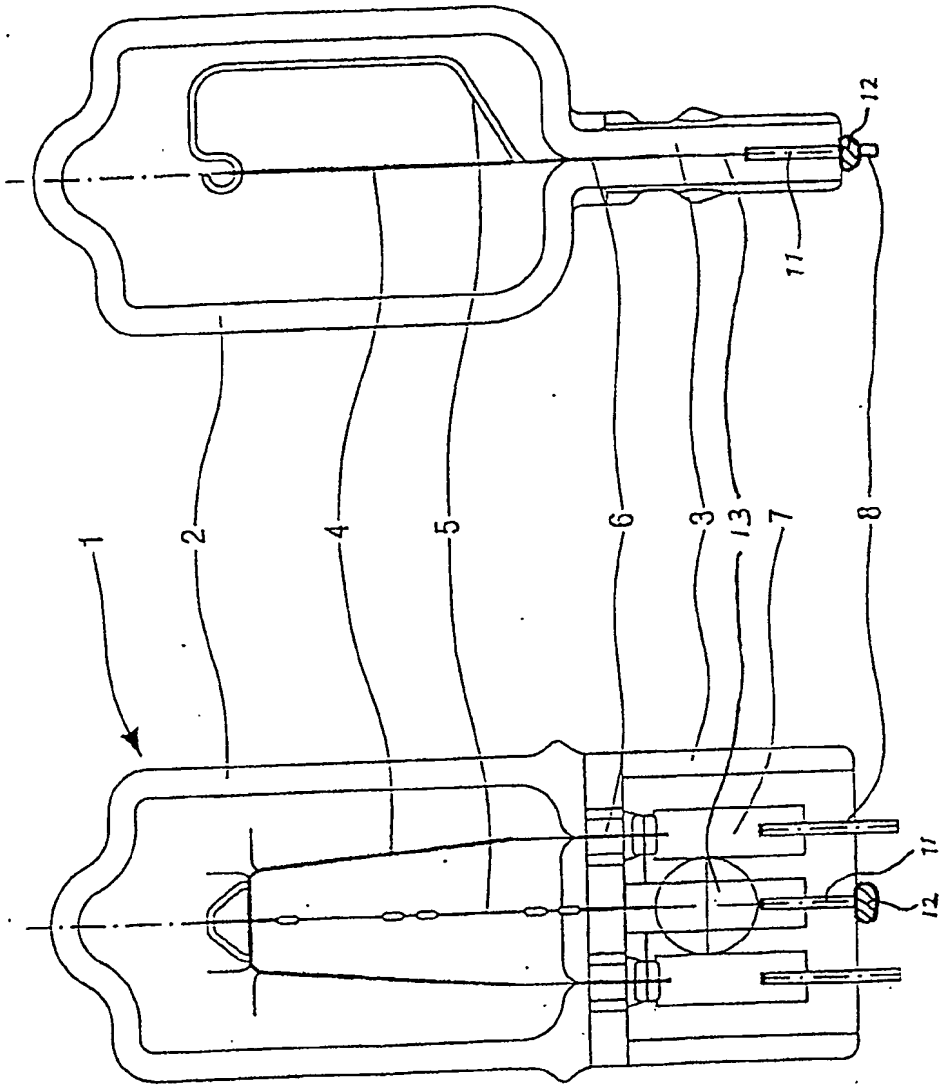


FIG. 4B

FIG. 4A